

Exploring Meteorite Mysteries

Solar System ABC's Fact Sheet

Bodies in the Solar System

Listed are the Sun and bodies in the solar system that may be sources of meteorites. These include major bodies (planets) and minor bodies (Moon, asteroids and comets). Given are the body name, diameter, orbit, and surface and atmosphere composition. Orbital data include distance from the Sun (AU, semi-major axis), and eccentricity (e: 0 for circular, 1.0 for parabolic, and values between are elliptical).

Body	Diameter km	Orbit AU	Orbit e	Surface Composition	Atmosphere Composition
Sun	1,400,000	--	--	none	H ₂ , He, C, N
Mercury	4,880	0.4	0.20	silicates	none
Venus	12,100	0.7	0.01	silicates	thick CO ₂
Earth	12,800	1.0	0.02	silicates, H ₂ O	medium N ₂ , O ₂ , H ₂ O
Moon	3,480	1.0		silicates	none
Mars	6,800	1.5	0.09	silicates, H ₂ O, CO ₂ ices	thin CO ₂
Asteroids	<1,000	2.2-3.8	vary	silicates, iron	none
Jupiter	143,200	5.2	0.05	liquid H, silicate core	thick H ₂ , He
Saturn	120,000	9.5	0.06	liquid H, silicate core	thick H ₂ , He
Uranus	51,800	19.2	0.05	liquid H, silicate core	thick H ₂ , He, methane
Neptune	49,500	30.0	0.01	liquid H, silicate core	thick H ₂ , He, methane
Pluto	2,300	39.4	0.25	silicates	very thin methane
Comets	1-10	per: 4-7 40,000	0.4-0.9 1.0	H ₂ O, ices of methane, ammonia, silicates	H ₂ O, H, C, O, N compounds

Asteroids

Twenty asteroids are listed in order of distance from the Sun. Given are the asteroid number and name, year discovered, diameter, semi-major axis of orbit, and asteroid type. The first four asteroids are Earth or Mars-crossing and have elliptical orbits. The next 13 asteroids are all in the asteroid belt and have nearly circular orbits. These were chosen to include the largest of the common S and C type asteroids and examples of the rarer types U, E, M. The last three asteroids have orbits outside the asteroid belt. Hector is within the orbit of Jupiter.

Number	Name	Year	Size km	Orbit AU	Type
2062	Aten	1976	0.9	0.97	S
433	Eros	1898	23	1.46	S
1862	Apollo	932	1.4	1.47	U
1221	Amor	1932	1.0	1.92	S
4	Vesta	1807	549	2.36	U
7	Iris	1847	210	2.39	S
44	Nysa	1857	73	2.42	E
6	Hebe	1847	201	2.43	S
21	Lutetia	1852	115	2.43	M
19	Fortuna	1852	215	2.44	C
3	Juno	1804	265	2.67	S
1	Ceres	1801	940	2.77	C
2	Pallas	1802	540	2.77	C
45	Eugenia	1857	228	2.72	C
16	Psyche	1852	265	2.92	M
10	Hygeia	1849	410	3.14	C
65	Cybele	1861	280	3.43	C
279	Thule	1888	60	4.26	D
624	Hector	1907	150x300	5.15	D
944	Hildago	1920	39	5.80	D

Comets and Meteor Showers

Listed are ten periodic meteor showers, their dates of peak annual activity, and the comet associated with each shower. Meteors are produced when the Earth passes through the orbit of the comet and its residual gas and dust particles burn up in the atmosphere.

Comet	Shower	Date
149II	Quadrantids	January 3
Thatcher	Lyrids	April 23
Halley	Aquarids	May 4
Encke	Taurids	June 30
Swift-Tuttle	Perseids	August 12
Giacobini-Zinner	Draconids	October 9
Halley	Orionids	October 21
Encke	Taurids	November 4
Temple	Leonids	November 16
Phaeton	Geminids	December 13

Evidence for Processes in the Solar System

Listed is the geologic evidence for rock-forming processes on various bodies in the solar system. Many of the processes occurred on all planetary bodies and some asteroids. However, the geologic evidence is not always available because it is masked by later processes.

Process	Earth	Moon / Mars	Asteroids (meteorites)
condensation	no evidence	no evidence	carbonaceous chondrites
accretion	no evidence	no evidence	chondrites
differentiation	core/mantle/crust	anorthosites, meteorites	irons, stony-irons
volcanism	basalts, volcanoes	mare basalts, meteorites	basaltic achondrites
metamorphism	metamorphic rocks	lunar metamorphic rocks	chondrites
weathering	sedimentary rocks	Mars geology, meteorites	carbonaceous chondrites
impact	meteorite falls, craters	breccias, craters	meteorites, breccias

Solar System Timeline

Listed are major events or processes in the history of the solar system as determined from the geologic or astronomical evidence. Time is in years (y) before the present (K=thousand; M=million; B=billion). Some of the events on the Moon are not discussed in this book, but are explained in the companion volume *Exploring the Moon*.

Time	Where	Event or Process	Evidence
0 y - 4.0 By	Earth	volcanism, metamorphism, weathering	Earth rocks, geology
3, 25, 47 y	Earth	falls-Noblesville, Allende, Sikhote-Alin	meteorites
50 Ky	Earth	fall of Canyon Diablo, Meteor Crater	crater, meteorite
0.1-11 My	Moon	impacts sent lunar meteorites to Earth	lunar meteorites
0.5-16 My	Mars	impacts sent Mars meteorites to Earth	Mars meteorites
65 My	Earth	K/T impact and death of dinosaurs	Ir in soils, fossils
0.2-4.5 By	Mars	basaltic volcanism, intrusions	Mars meteorites
3.2-4.3 By	Moon	mare basaltic volcanism	lunar basalts, meteorites
3.7 By	Earth	first evidence of life on Earth	fossils
3.9 By	Moon	cataclysmic bombardment	breccias, craters
4.0 By	Earth	oldest known Earth rock	Earth rocks
4.2-4.4 By	Moon	igneous intrusions	troctolite, norite
4.2-4.55 By	Asteroids	metamorphism, weathering	chondrites
4.4-4.5 By	Moon	differentiation, magma ocean	anorthosites, meteorites
4.55 By	Asteroids	differentiation, core, mantle, crust	achondrite, iron, stony-iron
4.55 By	nebula	solar system forms by condensation, accretion	chondrites, astronomy
4.6 By	nebula	Sun forms from nebula	astronomy, physics
>4.6 By	Stars	elements form in other stars	astronomy, physics
~10 By	Universe	H, He formed by "Big Bang"	astronomy, physics